Guest Editorial

Erik Cambria and Soujanya Poria
Nanyang Technological University, SINGAPORE

Amir Hussain
Edinburgh Napier University, UK

Bing Liu
University of Illinois at Chicago, USA

Computational Intelligence for Affective Computing and Sentiment Analysis

Emotions are intrinsically part of our mental activity and play a key role in communication and decision-making processes. Emotion is a chain of events made up of feedback loops. Feelings and behavior can affect cognition, just as cognition can influence feeling. Emotion, cognition, and action interact in feedback loops and emotion can be viewed in a structural model tied to adaptation. Besides being important for the advancement of AI, detecting and interpreting emotional information are key in multiple areas of computer science, e.g., human-computer interaction, e-learning, e-health, domotics, automotive, security, user profiling and personalization.

In recent years, emotion and sentiment analysis has become increasingly popular also for processing social media data on social networks, online communities, blogs, Wikis, microblogging platforms, and other online collaborative media. The distillation of knowledge from such a big amount of unstructured information, however, is an extremely difficult task, as the contents of today's Web are perfectly suitable for human consumption, but remain hardly accessible to machines. The opportunity to capture the opinions of the general public about social events, political movements, company strategies, marketing campaigns, and product preferences has raised growing interest both within the scientific community, leading to many exciting open challenges, as well as in the business world, due to the remarkable benefits to be had from marketing and financial market prediction.

Most of existing approaches to affective computing and sentiment analysis are still based on the syntactic representation of text, a method that relies mainly on word co-occurrence frequencies. Such algorithms are limited by the fact that they can only process information they can 'see'. As human text processors, we do not have such limitations as every word we see activates a cascade of semantically related concepts, relevant episodes, emotions, and sensory experiences, all of which enable the completion of complex natural language processing tasks – such as word-sense disambiguation, textual entailment, and semantic role labeling – in a quick and effortless way. Computational intelligence can aid to mimic the way humans process and analyze text and, hence, overcome the limitations of standard approaches to affective computing and sentiment analysis.

This special issue aimed at bringing together contributions from both academics and practitioners in the context of emotion and sentiment analysis in order to address the wide spectrum of issues related to affective computing research and, hence, better grasp the current limitations and opportunities related to this fast-evolving branch of AI. Out of the 61 submissions received for this special issue, only 5 were accepted. Each of these has undergone several rounds of revisions and has been reviewed by three or more reviewers.

The survey paper *"Adversarial Training in Affective Computing and Sentiment Analysis: Recent Advances and Perspectives"* by Jing Han, Zixing Zhang, Nicholas Cummins, and Björn Schuller reviews the state of the art of a potentially crucial technique for the development of next-generation emotional AI systems. In the paper, various representative adversarial training algorithms are explained and discussed accordingly, aimed at tackling diverse challenges associated with emotional AI systems. Authors also highlight a range of potential future research directions, hoping to facilitate the development of adversarial training for affective computing and sentiment analysis in both the academic and industrial communities.

In *"Sensing Affective Response to Visual Narratives"*, Mihai Burzo, Verónica Pérez-Rosas, Daniel McDuff, Louis-Philippe Morency, Alexis Narvaez, and Rada Mihalcea introduce a multimodal approach for detecting individuals' affective states while being exposed to visual narratives. Authors use four modalities, namely visual facial behaviors, heart rate measurements, thermal imaging, and verbal descriptions, and show that they can predict changes in the affect that people experience when they are exposed to audio-visual stimuli (either positive or negative).

In *"An Evolutionary Strategy For Concept-Based Multi-Domain Sentiment Analysis"*, Mauro Dragoni addresses the problem of inferencing the sentiment

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expressed within a document while considering the domain dimension. The SenticNet resource is used as a starting point for extracting both concepts and common-sense expression relevant for the sentiment analysis topic. Subsequently, the creation of semantic relations is performed by exploiting the alignments between SenticNet and WordNet. Finally, an evolutionary strategy has been implemented for learning the polarity values of concept-domain pairs.

Next, the article *"Understanding the Psycho-Sociological Facets of Homophily in Social Network Communities"* by R Sudhesh Solomon, Srinivas P Y K L, Amitava Das, Björn Gambäck, and Tanmoy Chakroborty aims to understand the behavioral similarity of users present in their personal neighborhood communities and addresses two fundamental questions: (i) Are communities formed by users who possess similar behavioral traits? If so, does this apply to all those sub-networks, i.e., friends, relatives, and colleagues? (ii) Does adding behavioral node-specific attributes/features to the nodes in a network lead to better community detection? Empirical results based on the psycho-sociological behavior show that friends networks exhibit homophily, whereas relatives and colleagues networks do not exhibit such homophilic behavior.

Finally, *"Neighboring Words Representation in WordNet for Lexical Similarity and Sentiment Classification"* is presented by Sergio Jimenez, Fabio A. González, Alexander Gelbukh, and George Dueñas. This article proposes a new set cardinality-based method for measuring lexical similarity, which exploits the WordNet graph, obtaining a word representation based on related neighboring words. Authors show that the features extracted from set cardinalities computed using this word representation, when fed into support vector regression classifier trained on a dataset of common synonyms and antonyms, produce results competitive with those of word-embedding approaches.

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